

On CERTAIN POINTS in the ANATOMY of PERIPATUS CAPENSIS.
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THE discovery by Mr. Moseley² of a tracheal system in *Peripatus* must be reckoned as one of the most interesting results obtained by the naturalists of the "Challenger." The discovery clearly proves that the genus *Peripatus*, which is widely distributed over the globe, is the persisting remnant of what was probably a large group of forms, from which the present tracheate Arthropoda are descended.

The affinities of *Peripatus* render any further light on its anatomy a matter of some interest; and through the kindness of Mr. Moseley I have had an opportunity of making investigations on some well preserved examples of *Peripatus capensis*, a few of the results of which I propose to lay before the Society.

I shall confine my observations to three organs. (1) The segmental organs, (2) the nervous system, (3) the so-called fat bodies of Mr. Moseley.

In all the segments of the body, with the exception of the first two or three postoral ones, there are present glandular bodies, apparently equivalent to the segmental organs of Annelids.

These organs have not completely escaped the attention of previous observers. The anterior of them were noticed by Grube,³ but their relations were not made out. By Saenger,⁴ as I gather from Leuckart's 'Bericht' for the years 1868-9, these structures were also noticed, and they were interpreted as segmental organs. Their external openings were correctly identified. They are not mentioned by Moseley, and no notice of them is to be found in the text-books. The observations of Grube and Saenger seem, in fact, to have been completely forgotten.

The organs are placed at the bases of the feet in two lateral divisions of the body-cavity shut off from the main central median division of the body-cavity by longitudinal septa of transverse muscles.

Each fully developed organ consists of three parts:

(1) A dilated vesicle opening externally at the base of a foot.

(2) A coiled glandular tube connected with this and subdivided again into several minor divisions.

¹ From the 'Proceedings of the Cambridge Philosophical Society.'

² "On the Structure and Development of *Peripatus Capensis*," 'Phil. Trans.,' vol. clxiv, 1874.

³ "Bau von *Perip. Edwardsii*," 'Archiv f. Anat. u. Phys.,' 1853.

⁴ "Moskauer Naturforscher Sammlung," 'Abth. Zool.,' 1869.

(3) A short terminal portion opening at one extremity into the coiled tube (2) and at the other, as I believe, into the body-cavity. This section becomes very conspicuous in stained preparations by the intensity with which the nuclei of its walls absorb the colouring matter.

The segmental organs of *Peripatus*, though formed on a type of their own, more nearly resemble those of the Leech than of any other form with which I am acquainted. The annelidan affinities shown by their presence are of some interest. Around the segmental organs in the feet are peculiar cells richly supplied with tracheæ, which appear to me to be similar to the fat bodies in insects. There are two glandular bodies in the feet in addition to the segmental organs.

The more obvious features of the nervous system have been fully made out by previous observers, who have shown that it consists of large paired supraœsophageal ganglia connected with two widely separated ventral cords—stated by them not to be ganglionated. Grube describes the two cords as falling into one another behind the anus—a feature the presence of which is erroneously denied by Saenger. The lateral cords are united by numerous (5 or 6 for each segment) transverse cords.

The nervous system would appear at first sight to be very lowly organised, but the new points I believe myself to have made out, as well as certain previously known features in it, appear to me to show that this is not the case.

The following is a summary of the fresh points I have observed in the nervous system :

(1) Immediately underneath the œsophagus the œsophageal commissures dilate and form a pair of ganglia equivalent to the annelidan and arthropodan subœsophageal ganglia. These ganglia are closely approximated and united by 5 or 6 commissures. They give off large nerves to the oral papillæ.

(2) The ventral nerve cords are covered on their ventral side by a thick ganglionic layer,¹ and at each pair of feet they dilate into a small but distinct *ganglionic swelling*. From each ganglionic swelling are given off a pair of large nerves² to the feet; and the ganglionic swellings of the two cords are connected together by *a pair of commissures containing ganglion cells*.³ The other commissures connecting the two cords together do not contain ganglion cells.

The chief feature in which *Peripatus* was supposed to differ

¹ This was known to Grube, loc. cit.

² These nerves were noticed by Milne Edwards, but Grube failed to observe that they were much larger than the nerves given off between the feet.

³ These commissures were perhaps observed by Saenger (loc. it.).

from normal Arthropoda and Annelida, viz. the absence of ganglia on the ventral cords, does not really exist. In other particulars, as in the amount of nerve cells in the ventral cords and the completeness of the commissural connections between the two cords, &c., the organisation of the nervous system of *Peripatus* ranks distinctly high. The nervous system lies within the circular and longitudinal muscles, and is thus not in proximity with the skin. In this respect also *Peripatus* shows no signs of a primitive condition of the nervous system.

A median nerve is given off from the posterior border of the supræesophageal ganglion to the œsophagus, which probably forms a rudimentary sympathetic system. I believe also that I have found traces of a paired sympathetic system.

The organ doubtfully spoken of by Mr. Moseley as a fat body, and by Grube as a lateral canal, is in reality a glandular tube, lined by beautiful columnar cells containing secretion globules, which opens by means of a non-glandular duct into the mouth. It lies close above the ventral nerve cords in a lateral compartment of the body-cavity, and extends backwards for a varying distance.

This organ may perhaps be best compared with the simple salivary gland of *Julus*. It is not to be confused with the slime glands of Mr. Moseley, which have their opening in the oral papillæ. If I am correct in regarding it as homologous with the salivary glands so widely distributed amongst the Tracheata, its presence indicates a hitherto unnoticed arthropodan affinity in *Peripatus*.
